UTCS ComputerNews

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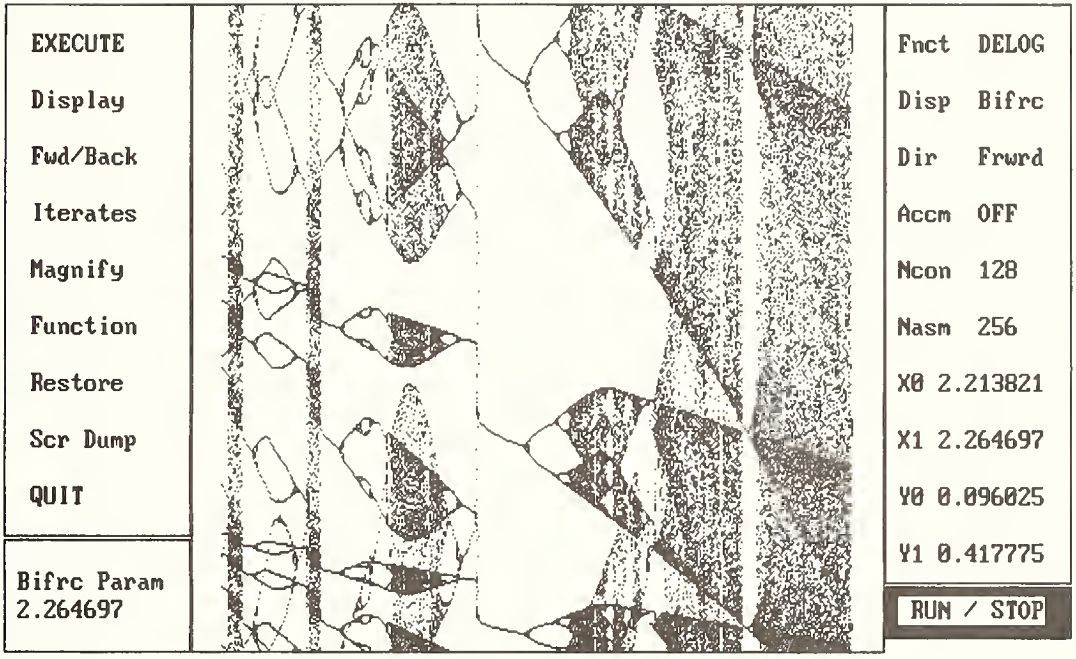
computing services

IN THIS ISSUE

Numerical and Scientific Software

Maps and Bifurcations



Bifrc Param 2.264697

Fnct DELOG
Disp Bifrc
Dir Frwrd
Accm OFF
Ncon 128
Nasm 256
X0 2.213821
X1 2.264697
Y0 0.096025
Y1 0.417775

Andrzej Pindor examines GAMS, CURVE^{fit} and Chaos on the Computer

Other Features

Microsoft Word 5.0

Harriet Hua Ji examines the latest version from Microsoft Corporation.

page 7

MacWorld Conference

Multimedia processing developments and new software releases, as observed by Geoffrey Rockwell.

page 12

WATFOR-77 Compiler

Reinhard Schuller discusses the latest updates.

page 6

ISSN 0315-4661 October 1989 No. 258

Contents

Numerical and Scientific Software for Microcomputers

GAMS 1
Curve^{fit} 2
More Chaos on Your Computer 4

News

WATFOR-77 V3.1 6

MacWorld: Multimedia Computing 12

Microcomputer Courses 20

Reviews

What Makes Microsoft Word 5.0 Better than Word 4.0? 7

WordPerfect 5.0 for 4.2 Users 10

Print View (View Document) in WordPerfect 5.0 10

Macintosh Models 16

The Dash—More than Just a Straight Line 18

Departments

Documents at UTCS 21
Consulting and Enquiries 23
UTCS Directory 23
UTCS Terminal and Advising Sites 24
UTCS Services 25
UTCS Software List 26

Acknowledgements:

Thanks to Kristen Rosbak for her assistance in editing this issue.

Publisher
University of Toronto Computing Services
Toronto, Ontario
Canada M5S 1C1

Editor: Patricia Hood

Publications Assistant: Maureen Monné

Publication Date: *October 1, 1989*

Subscriptions
Subscriptions run for one year, beginning each January. Changes should be entered on the form at the back of this issue and mailed to *ComputerNews*, 4 Bancroft Avenue, Room 217 (or phone 416-978-4034). FAX: (416)978-7159.

ComputerNews is published eight times yearly by the University of Toronto Computing Services (UTCS). Enquiries should be directed to:

The Editor
ComputerNews
University of Toronto Computing Services
4 Bancroft Avenue, Room 217
Toronto, Ontario
Canada M5S 1A1

Network address:
phood@vm.utcs.utoronto.ca
(NetNorth/BITNET/EARN)

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Numerical & Scientific Software for Microcomputers

GAMS: General Algebraic Modeling System for PCs

Andrzej Pindor
apindor@vm.utcs.utoronto.ca

GAMS is a modeling package designed to make the construction and solution of large and complex mathematical programming models more straightforward for programmers and more comprehensible to users of models from other disciplines, e.g., economists. Available on many mainframe systems and workstations, GAMS has recently been ported to DOS-based microcomputers. The Scientific Press, which distributes the package, provided UTCS with a complimentary copy of GAMS software (Student Edition) for a DOS-based machine.

The GAMS package consists of three modules, each available separately. The base GAMS module contains a model compiler and BDMLP solver for LPs (Linear Problems). The BDMLP solver can handle 32,767 rows by 32,767 columns with a maximum 32,767 nonzero elements.

The GAMS/MINOS module, with an adapted version of the MINOS (Modular In-Core Nonlinear Optimization System) solver for LPs and NLPs (Nonlinear Problems), is also included in the package. It can handle 32,767 rows by 32,767 columns with a maximum 2,147,483,647 nonzero elements and 32,767 nonlinear nonzeros.

The GAMS/ZOOM module, containing adapted versions of XMP and ZOOM (Zero/One Optimization Methods) solvers for LPs and mixed integer LPs, is the third part of the package. It can handle about 200 zero/one variables.

The Student Edition, which includes all three modules, is limited to models with 500 nonzero elements, 100 nonlinear nonzeros (MINOS solver only), and 20 discreet variables (ZOOM solver only). Unfortunately, having access to this version only, I was unable to test the limits on model size for a full PC version. One advertisement from the company claims that a linear programming model with 458 rows, 2968 columns, and 7252 nonzero elements, requiring 1368 iterations, has been solved on a PC.

GAMS' PC version requires a hard disk, and at least 512KB of RAM. It can take advantage of a math coprocessor, but does not require one. Unfortunately, the program cannot address more than 640K of memory and it can be expected that large problems will soon encounter memory limits.

To compare GAMS' performance with that of similar software, I ran identical optimization problems using both GAMS (Student Version) installed on our Zenith AT (6 MHz, Math coprocessor), and SAS/OR software on the UTCS IBM 4381 mainframe (the SAS/OR module is not included in our SAS/PC license). I chose a classical Minimum Cost Diet problem from the sample programs supplied by SAS. A number of food types, characterized by unit cost and unit content of certain basic nutrients, are provided, and a minimum cost diet must be created, based on recommended daily requirements for these nutrients and a maximum amount of each food type to be consumed daily.

Writing a GAMS program for this problem was surprisingly easy, which speaks well for the very natural structure of the programming language and the way it is presented in the manual.

Input data for the two runs was identical to four decimal places and the resulting minimum values of the cost function agreed to better than 0.1% , with good agreement for other solution parameters.

Running times were: 0.32 seconds for the SAS program on the UTCS mainframe and 17.3 seconds for the GAMS program (execution) on Zenith AT (a ratio of about 52:1). Considering that for typical SAS programs a ratio of the mainframe and our PC execution times is about 50:1, it seems that the GAMS optimization runs roughly as efficiently as the SAS/OR. (An additional 11.4 seconds were used by the GAMS program to generate and compile the equations.)

cont. on next page

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Those who would like to examine the GAMS package in more detail are invited to contact Andrzej Pindor at 978-5045.

Vendor: The Scientific Press, 507 Seaport Court, Redwood City, CA 94063, USA

Hardware requirements: IBM compatible, 512K RAM, hard disk; math coprocessor recommended but not required.

Pricing: Student Edition : US$75

Full version (academic price):

Base GAMS	US$320
GAMS/MINOS	US$320
GAMS/ZOOM	US$320

Workstation version (also 80386 machines): 100% more than PC version.

CURVE^{fit}: Curve-fitting and Data Modeling Package

Andrzej Pindor
apindor@vm.utcs.utoronto.ca

CURVE^{fit}, from Lema Bytes Corporation, is a small, menu-driven software package for DOS-based computers. **CURVE**^{fit} is designed to fit data using one of the following models:

- **polynomial model:** $$y(x)=\sum_{i=0}^{N} A_i x^i$$
- **rational polynomial model:** $$y(x)=\frac{\sum_{i=0}^{N} A_i x^i}{\sum_{j=0}^{M} B_j x^j}$$
- **Fourier Series:** $$y(x)=\sum_{i=0}^{M} e^{D_i x}[A_i cos(W_i x)+B_i sin(W_i x)]$$

The program can also generate model data from user-supplied functions. Most elementary functions are available.

My experience with the package was based on a demonstration diskette provided by the vendor. Upon entering the program you are presented with a menu consisting of the following choices:

- **Read New Data**
- **Save Modeled Data**
- **Plot Original Data**
- **Plot Modeled Data**
- **Build a Data Model**
- **Modify/Examine Input Data**
- **Generate and Save Sample Data**
- **Utilities - Splines, Transforms**

The Demonstration Diskette

The demonstration diskette does not allow you to read any external data. You may choose between two sets of data supplied by the authors: a 21 point set (generated from Fourier Series of order 2) and a 31 point set (third order polynomial). The small size of both sets makes it impossible to see how efficient the fitting algorithm is. (The authors stress that they are using revolutionary mathematical techniques that allow them to find closed-form solutions to both linear and nonlinear modeling problems.)

When plotting of input data is requested, you have three options: plotting the data only, plotting data points with joining lines, or plotting the connecting lines only. The axes are automatically adjusted to give the best possible presentation of the data.

Choosing the menu option **Plot Modeled Data** resulted in the computer hanging up and even Ctrl-Alt-Del couldn't reboot it! I had to shut it down. Admittedly, choosing this option when no modeled data was available was silly, but it did not justify such a drastic malfunction. Hopefully, this is a characteristic of the demonstration software only.

Requesting **Build a Data Model** gives you a choice of the three models mentioned above (you may decide the order required for each of them, i.e., a number of fitting coefficients). Unfortunately, the way the model formula is presented on the screen is very primitive and confusing:

Fourier Series model one is presented with the following information on the screen:

```
Y(X) = Exp (Di*X ) * [ Ai * cos ( Wi*X ) + Bj * sin ( Wi*X ) ]
Enter ORDER of expansion (i+j)
or '0' to return to DATA MENU->
```

(Note: Bj - it is not a misprint.)

After the model is fitted, you may examine and compare the original and fitted values, and plot both sets of values, with the original data presented in white and the fitted data in blue. (On a monochrome monitor, the original data is highlighted to separate it from the fitted data.) Then the coefficients of the model may be saved to a file.

Other Options

The next main menu option, **Modify/Examine Input Data**, allows you to perform a number of predefined transformations on the input data (i.e. square root or log of X or Y), or define your own transformations. You may also add the data to, or multiply by, data contained in an external file.

The option **Generate and Save Sample Data** may be used to create a set of data using one of the three functional forms mentioned above, or an arbitrary user-defined formula. Data may also be created corresponding to Gaussian-distributed noise, with mean, variance, and number of points to be chosen by the user; however, no explanation is given on the algorithm used to generate these numbers. This noise can then be added to other smooth sample data to model a realistic set of data.

Finally, data may be generated by reading coefficients from an external file (created earlier when coefficients of a model were saved).

The last option, **Utilities - Splines, Transforms**, allows you to perform Fourier transforms on the input data or to model the input data using quasi-splines or regular splines (the tension coefficient can be adjusted). You can also find roots of a polynomial or a rational polynomial using its coefficients, read from a file that was created when coefficients of a model were saved some time earlier.

Judging from the demonstration diskette, **CURVE**$^{\text{fit}}$ is a package of rather narrow scope within which it gives the user flexibility and ease - it works with very little intervention. If you routinely do curve fitting it may be a good choice, although its price (US$150) may seem a bit high considering its very limited applicability.

Vendor:

Lema Bytes Corporation
P.O. Box 744,
Oakhurst, NJ 07755
USA

Hardware requirements:

IBM PC, XT, AT, or PS/2 compatible, minimum 256K RAM, CGA, EGA or Hercules Monochrome Graphics Adapter with CGA emulator. A math coprocessor will be used if present.

Price: US$150

More Chaos on Your Computer

Andrzej Pindor
apindor@vm.utcs.utoronto.ca

In the January/February issue of *ComputerNews* (#252), I described Dynamical Software, a software package for studying dynamical systems. (This relatively new interdisciplinary field is also referred to as "Chaos.") Dynamical Software Inc., authors of the package, have announced plans to produce a series of small educational programs for this field, entitled *Chaos In The Classroom*. The first program of the series, "CITC001: Maps and Bifurcations," is available and I describe it below. The second program, "CITC002: Fractals and Julia Sets," is scheduled to appear in mid-September 1989.

The intention of the *Chaos In The Classroom* series is to allow the student to explore various aspects of nonlinear science with a minimum of "fuss and bother." The programs are menu-driven, but do not require a Microsoft or compatible mouse. (A program, KMOUSE, is provided for keyboard emulation of the mouse.) The program requires an EGA or VGA video board and can make use of a math coprocessor, if one is available.

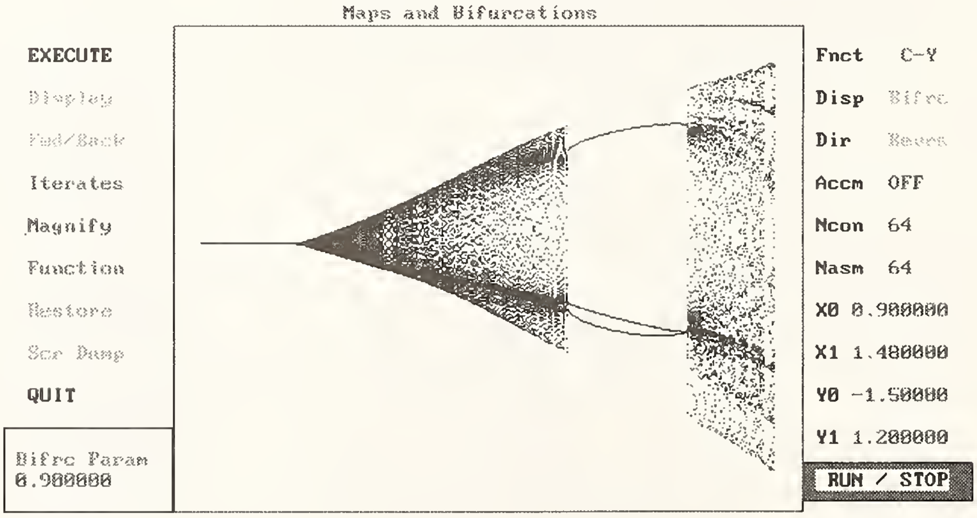
The Maps and Bifurcations program allows you to study bifurcation diagrams and phase portraits of eight different discrete dynamical systems: logistic map, seasonal logistic map, Henon map, population growth with two age classes, delay logistic equation, Curry-Yorke map, predator-prey model, and bouncing ball.

When you start the CITC001 program, a display as in *Figure 1* will appear. The screen is divided up as follows:

- The **Main Menu** appears on the left and lists a series of options.
- The **Status Display** appears on the right. As options are chosen, the Status Display is automatically updated.
- The **Viewport**, centre, is the main part of the screen in which displays are plotted (In *Figure 1*, the Viewport shows the bifurcation diagram for a Curry-Yorke map.)
- The **Parameter Window**, at the bottom left, shows the actual value of the bifurcation parameter.
- The **Run/Stop Window** is in the bottom right corner. When a program executes, the cursor is moved to this window. Pressing the right mouse button interrupts the execution, which can then be aborted or continued.

The **Option Display** in the Main Menu allows you to choose between displaying a bifurcation diagram (Figure 1), a phase portrait for a given value of the bifurcation parameter (*Figure 2*, showing the phase portrait for Curry-Yorke map), or a three-way display mode that allows simultaneous observation of the time series, the bifurcation diagram, and the phase portrait (*Figure 3*, showing a three-way display for the predator-prey model; note the value of the bifurcation parameter in the Parameter Window for which the phase portrait is shown).

You can modify the direction in which the bifurcation parameter changes (option **Fwd/Back**), the number of iterations which are performed before convergence is assumed (these values are rejected), and number of iterations performed in the asymptotic region (option **Iterates**). Option **Magnify** allows you to enlarge a part of phase space by choosing a region of display and expanding it to fill the whole Viewport. Option **Function** toggles among different models enumerated above; **Restore** will reconstruct the original bifurcation diagram, i.e., the



```
Fnct   C-Y
Disp   Bifrc
Dir    Revrs
Accm   OFF
Ncon   64
Nasm   64
X0 0.900000
X1 1.400000
Y0 -1.50000
Y1 1.200000
```

```
Bifrc Param
0.900000
```

Figure 1: CITC001 displaying bifurcation diagram.

first diagram constructed for the current function, resetting all parameters to their default values. Finally, the **Scr Dump** option saves the current screen creating a .PCX file. The utility program, DSREST, included with CITC001, can restore your picture at a later time.

The program manual gives a short introduction to the field of chaos, with extensive references to the relevant literature and a clear description of all the program features. I found it to be well-written.

UTCS has obtained a site license for CITC001 program and we can distribute it to interested people for $12 a copy; manuals are extra, $28 a copy, and they have to be ordered (we do not keep them in stock). Inquiries about obtaining a copy of the program should be directed to Andrzej Pindor at 978-5045.

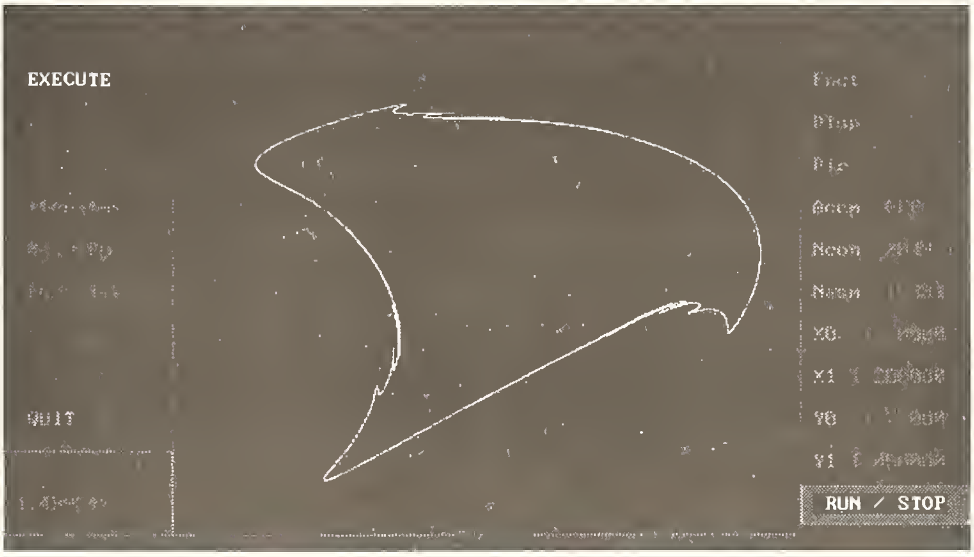
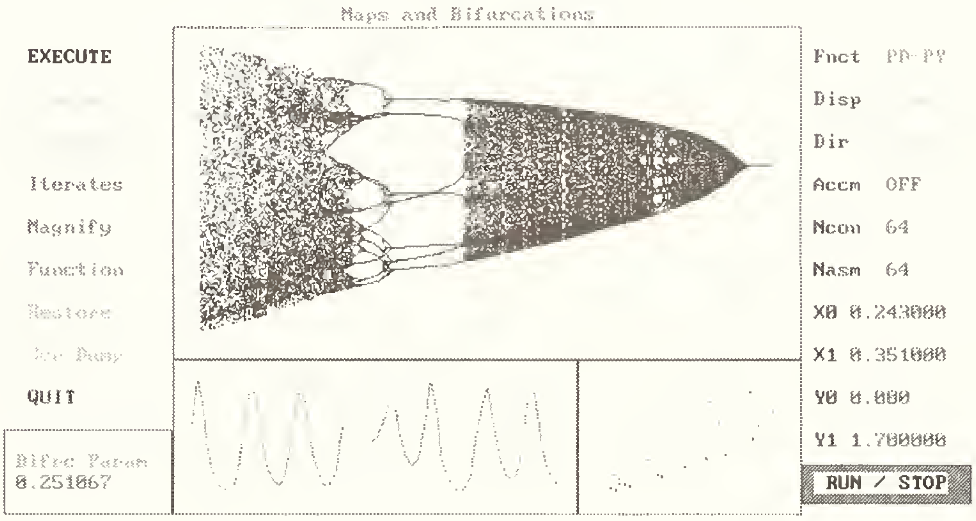


Figure 2: Phase portrait for Curry-Yorke map.



Bifrc Param
0.251067

Fnct PP-PY
Disp
Dir
Accm OFF
Ncon 64
Nasm 64
X0 0.243000
X1 0.351000
Y0 0.000
Y1 1.700000

Figure 3: Three-way display for predator-prey model.

WATFOR-77 V3.1

Reinhard Schuller
schuller@vm.utcs.utoronto.ca

UTCS has renewed its university-wide site license for the WATFOR-77 compiler. This product is available to University of Toronto staff, faculty, and graduate students. There are two versions of the compiler: one utilizes a math coprocessor and the other does not. Each license costs $35.00 and must be paid from research funds. The Graphics Kernel Subsystem (GKS) library of subroutines costs an additional $5.00. The complete package for either compiler consists of two 360KB diskettes which run on the IBM PC and PS/2 with DOS, plus one diskette for GKS. Manuals are available from the UTCS Information Office (978-4990).

Changes to WATFOR-77/PC

Version 3.1 of the compiler does not have as many major changes as last year's 3.0 release. Three notable improvements are:

- Unused variables are flagged with a warning message, with the exception of variables named in COMMON or EQUIVALENCE statements or as PARAMETER constants.
- The package now includes a C header file, FORTRAN.H, so C subprograms can be called from within FORTRAN applications compiled by WATFOR-77.
- WATFOR-77 now supports the ISO binary pattern and bit processing functions. These functions provide common boolean and shift operations, as well as bit functions to test, set, and clear bits.

Changes to the WATCOM GKS Library

The GKS subroutine library has been updated to Version 1.4, from the previous release, Version 1.3. Among the new enhancements are:

- The subroutine **gstxfp** (Set Text Font and Precision), that can be used to select fonts and display text, is included.
- The GKS cover functions, developed by WATCOM to simplify the use of the GKS, have been extended to support Pixel Arrays and GKS Metafiles.
- Programs have been included to print Pixel Array files to a number of output devices, including the Hewlett Packard LaserJet printer.

Changes to the WATCOM Editor

The WATCOM Editor has undergone the most changes, with release 4.0 replacing Version 3.0. Enhancements include new commands and the revision of some existing commands, the addition of windowing, and mouse support. Function key assignments have been revised and new functions added. The highlights include:

- A one-level backup feature for the editor.
- Case-insensitive, as well as case-sensitive, string matching .
- The new command, "!", to add comment lines to the editor command files.
- Two new editor command files, V3KEYS.EDI and V4KEYS.EDI, that define function keys binding to a superset of the WATCOM Editor Version 3 key definitions, or Version 4 default function keys, respectively.

If you would like further information or are interested in obtaining a copy under the UTCS site license, please call Reinhard Schuller at 978-6878 or Advising Services at 978-HELP.

What Makes Microsoft Word 5.0 Better than Word 4.0?

Harriet Hua Ji
huaji@gpu.utcs.utoronto.ca

Microsoft Word entered IBM PC territory about five years ago. The fifth version in five years, Word 5.0 represents a big step forward for Microsoft Word on the PC. Word 5.0 is greatly improved in its desktop publishing abilities, its spreadsheet and graphic integration, and its on-screen display. According to Microsoft, Word's good combination of keyboard control, on-screen menus, and mouse support, makes it highly competitive with WordPerfect. It is hoped that the new version will help realize WYSIWYG (What You See Is What You Get), an attractive feature of the Macintosh, on the IBM PC.

Five years ago, Microsoft Word 1.0 offered a wide range of formatting choices, mouse support, easy text manipulation, and other features uncommon in word processors at the time. Word 2.0 added the tutorial, spell checking, EGA and Hercules graphic support, and several other new features. Word 3.0 was an impressive improvement, as it provided indexing and table of contents generation, sorting, outlining, and faster operation. Word 4.0 brought document retrieval, search and replacement of formats, line drawing and boxes, macros, and revision marks. However, it was still flawed by clumsy repagination, limited column display, slow spell checking, inaccurate page-viewing functions and other problems.

Microsoft Word 5.0 solves the problems handicapping Word 4.0, and is believed to compete well with WordPerfect 5.0. It can import graphics, place text and graphics anywhere on the page, edit on-screen columns, repaginate automatically, preview documents to see how they will look when printed, cross-reference, and perform automatic file backups. Major improvements have also been made to spell checking, macros, and tab setting.

Compared with Word 4.0, Word 5.0 has much more powerful mouse support, expanded menu commands, and a more effective shortcut key panel in support of its screen menus.

New and Improved Features

Auto Features

To solve the repaginating clumsiness of earlier versions, an **Auto** option is provided in the **Paginate** field of the Option menu. If text is inserted or deleted above a page break, the break is automatically repositioned.

The **Backup** and **Autosave** features ensure document preservation. In the event of a power failure, a special program reconstructs the text to the last keystroke.

Text Viewing

A new feature, **Print Preview,** displays how the document will print. This is an impressive improvement over Word 4.0.

On-screen display of multiple columns is now possible with Word 5.0. (See *Figure 1*, p. 8). **Show Layout**, on the Options menu, allows the integration of different column layouts on a common page. (In Version 4.0, it cannot show more than one column on the same screen.)

Running heads now align at the margin rather than the edge of the page, another problem 4.0 users discovered.

Desktop Publishing Improvements

Version 5.0 greatly enhances desktop publishing-style abilities which makes it highly competitive with WordPerfect 5.0.

Word 5.0 enables the user to include graphics, spreadsheet data, and other Word documents as dynamic components of a document. It can link to graphic images in .PCF, .PIC, HPGL, PostScript, TIFF, and Windows clipboard formats. It can also size, box, position, and anchor graphics so that text floats around pictures.

cont. on next page

cont. from previous page

The **File-export** options now include .RTF and plain ASCII with paragraph carriage returns. The ASCII-with-returns option is useful for file communications, although Microsoft Word still preserves form-feed codes in its "unformatted" file structure.

Text Manipulation

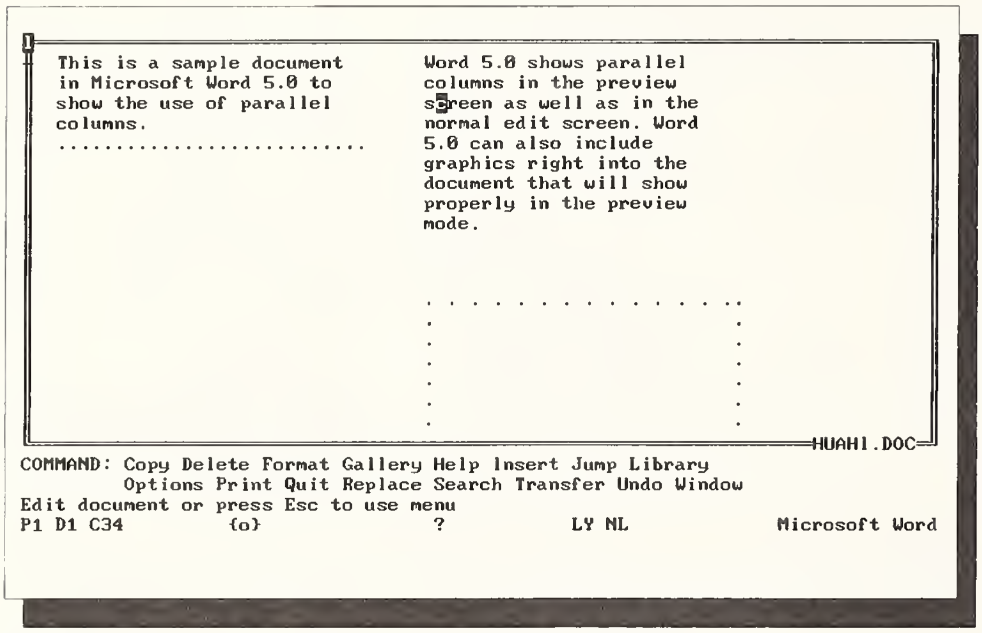
The new **show line breaks** option simplifies the task of aligning proportionally spaced text. The tab ruler also adjusts to different font sizes automatically.

The **Spell-check** feature is greatly expanded and improved in Version 5.0. It is first-rate in every aspect compared with other word processors.

The **Bookmark** feature expands the cross-referencing ability of Word. Any unit of text can be named and subsequently referred to by name. With **Jump Bookmark**, one can jump to any bookmark in any document. **Library Link Document** allows one to cross-reference bookmarks, or import bookmarks from other Word documents. This leaves the memory space free for sorting, indexing, and other memory-intensive operations.

The **Document Annotation** feature facilitates internal document review. Like footnotes, annotations appear in a separate window and can be printed at the bottom of a page or at the end of a document.

Setting tabs is much easier with Version 5.0. The text moves as the tab mark is moved on the ruler. Users can adjust the text until it's just the way they want it before carrying out the command and making the change permanent. (In Word 4.0, tab changes were not shown on the screen until after the command was carried out.)



```
This is a sample document      Word 5.0 shows parallel
in Microsoft Word 5.0 to       columns in the preview
show the use of parallel       screen as well as in the
columns.                       normal edit screen. Word
..........................     5.0 can also include
                               graphics right into the
                               document that will show
                               properly in the preview
                               mode.
                                                                HUAH1.DOC
COMMAND: Copy Delete Format Gallery Help Insert Jump Library
         Options Print Quit Replace Search Transfer Undo Window
Edit document or press Esc to use menu
P1 D1 C34        {o}              ?          LY NL         Microsoft Word
```

Figure 1: On-screen display of multiple columns.

Version 5.0 adds a three-way case toggle command that allows the change of characters to all capitals, initial capitals, or all lowercase by succession, more than Version 4.0's options of capitals and small capitals. The text itself is altered, not just its appearance, as in 4.0.

New default margins can be set without having to create a style sheet first.

Other Improvements

The Macro language of Version 5.0 has been expanded with several new features, including array variables, variables embedded in prompts, and the ability to detect and respond to low-memory and SAVE warning conditions.

Version 5.0 also provides large-screen support, including drivers for the IBM 8514A and 66-line Genius screens as well as standard drivers for Hercules, EGA, CGA, MCGA, VGA, AT&T and Toshiba.

Major Key Changes:

CTRL+F4	In text mode, toggles selected text between lowercase, uppercase, and first-letter-uppercase. In document retrieval, updates the document list (its function in Word 4.0).
CTRL+F9	Moves in and out of Print Preview. (In 4.0 it was used to repaginate a document.)
CTRL+5 (numeric pad) +LEFT or RIGHT arrow key	In Show Layout, the LEFT arrow moves to the previous column or object; RIGHT arrow moves to the next column or object.
CTRL+ALT+ENTER	Inserts a column break.
SPACEBAR, CTRL+SPACEBAR, CTRL+SHIFT+SPACEBAR	Marks or unmarks documents for retrieval.
ALT+F4	Moves in and out of Show Layout. (In 4.0 it was used to set margins.)
ALT+Q	Will indent highlighted text from left and right margins to nearest tab stops (a quick way to indent quotations).

The new features and improvements in Microsoft Word 5.0 make it one of the most powerful and flexible word processors available in today's computer environment. However, whether the new accomplishments of Microsoft Word on PC will be able to bridge the gap between Microsoft Word and WordPerfect, and that between PC and Macintosh, remains to be judged by its users.

For more information about Word 5.0, contact Harriet Hua Ji at 978-6050.

To obtain the Microsoft Word 5.0 update, contact:

MICROSOFT CANADA INC.
ATTN: Update Department
6300 Northwest Drive,
Mississauga, Ontario
L4V 1J7
(416) 673-7638

Send them the first page of your 4.0 manual (photocopies not acceptable) or one of your master disks, as proof of ownership, and a certified check for $110 (plus Provincial Sales Tax). The update is free if you purchased Word 4.0 on or after October 1, 1988 (enclose a dated sales receipt).

WordPerfect 5.0 for 4.2 Users

Patricia Hood
phood@vm.utcs.utoronto.ca

Are you still using WordPerfect 4.2, but wish you could master 5.0? Are you planning to upgrade to WordPerfect 5.0 by the end of year – before you lose support for 4.2 ? UTCS offers an Introduction to WordPerfect 5.0 for 4.2 Users course to help you make a smooth transition to this new version of the software.

Because you already know the basics from using 4.2, we focus on how and why version 5.0 is different, particularly in the areas of Character Formatting and Printing. We look at the design and appropriate use of new features, like Compose, Graphics, and Styles. We also assist you in learning the new keystrokes for old functions like Move, Footnotes, Page Numbering and Printing.

If you are interested in attending this course, the next session will be held from October 30 to November 3, 1989 from 12 noon to 2 p.m. each day. Contact Irene Rosiecki at 978-4565 for registration information.

Print View (View Document) in WordPerfect 5.0

Terry Jones
tj@vm.utcs.utoronto.ca

WordPerfect 5.0 has been available since May 1988. The program is stable now, following a rough start that involved new releases almost every month. Most WordPerfect 4.2 users have switched to or are currently switching to version 5.0 in order to take advantage of the extended capabilities that it has to offer.

The "print view" feature (**View Document - Shift-F7,V**), has been enhanced greatly in 5.0. It provides an accurate on-screen preview of what the printed page will look like. I use View Document often, but find that few people know about it or use it.

View Document uses your graphics screen to display how your document will print, allowing you to spot errors without wasting paper. A page in View Document accurately represents on screen what would print on paper, using the **currently selected printer**. While in View Document, you can select the view size. You can examine an entire page at a reduced size, most of a page at actual size (100%) as in *Figure 1*, or part of a page at double size (200%). When the page is actual or double size, you can use the arrow keys to select the portion of the page you want to view. There is also a facing page view that displays two consecutive pages simultaneously.

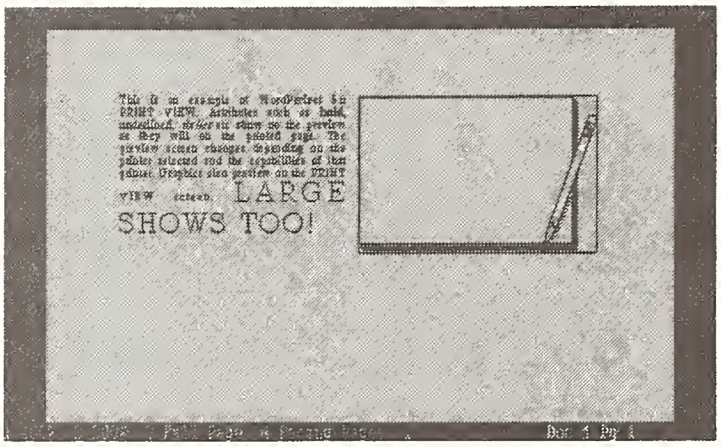
Virtually every print attribute shows up in the View Document screen, including bold, italics, underline, superscript, and subscript (see *Figure 2*). As well, you see size changes where you selected larger and smaller text. Headers, footers, page numbers, endnotes, and footnotes are also visible, allowing you to verify their contents as well as their style and positioning. Not all attributes are available on every printer, but View Document will show you what the selected attribute will look like on your currently selected printer.

View Document is particularly useful if your documents contain special characters (see *Figure 3*), such as accented letters, foreign language characters, foreign currency symbols, and line drawing characters. You cannot assume that because you can see a character on the edit screen that it will print. Use View Document to determine whether the special characters will print properly, and always bear in mind that they may print on one printer but not on another. Some special characters may be available on the dot matrix printer you use for proofs, but not on the laser printer you use for the final printing. Use View Document for each printer you plan to use, every time you make substantial revisions to your document. In this way, you can avoid unpleasant surprises during the final printing.

If a character doesn't display on the edit screen, this is not necessarily an indication that it won't print. The character may appear as a box because your edit screen cannot display the character, but your printer may be able to print it. Again, you can determine whether the character will print by using View Document. Characters that your printer cannot print will appear as blanks on the View Document screen. Characters that WordPerfect is unable to display correctly in View Document will appear as small, solid blocks to indicate that they will print on the selected printer. The rule is this: If the character itself, or a solid block, appears in View Document , then the character will print on the **currently selected** printer.

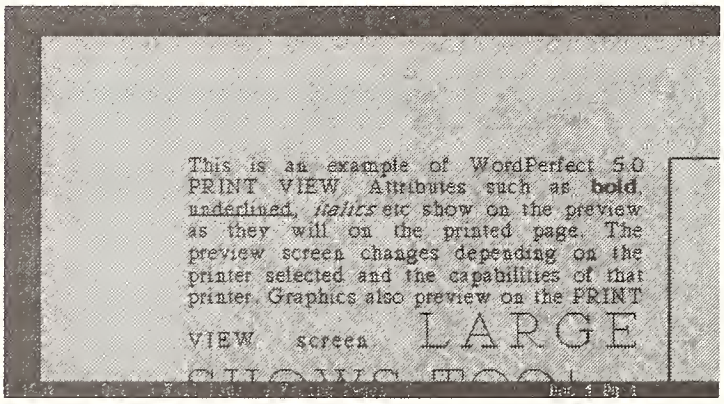
Scanned images, graphs, charts and drawings can be placed in WordPerfect 5.0 documents. These do not display on the edit screen, but are visible in View Document . Anyone using graphics should be using View Document frequently.

I am often puzzled by people who make the effort to use View Document but don't believe what they see. When they notice something that is incorrect in View Document, they print the page anyway, hoping that the printed version will be different. Rest assured that what you see is what you get. If things look wrong in View Document, they **won't** look right on the printed page.



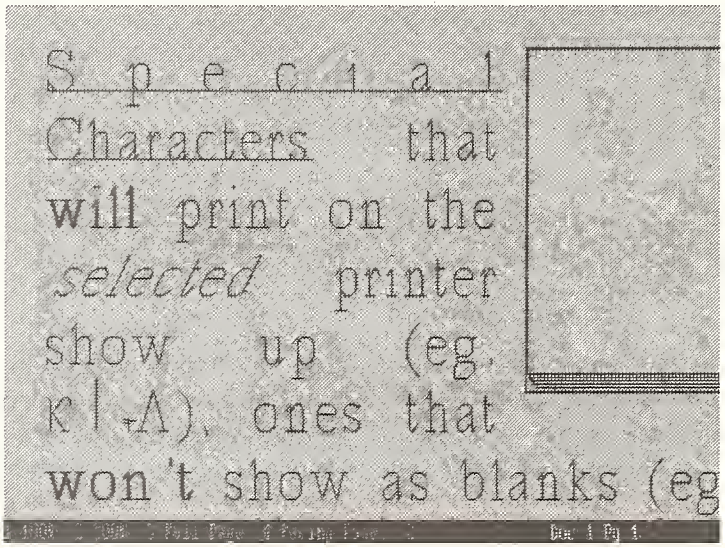
LARGE SHOWS TOO!

Figure 1: Actual size view of page.



This is an example of WordPerfect 5.0 PRINT VIEW. Attributes such as **bold**, underlined, *italics* etc show on the preview as they will on the printed page. The preview screen changes depending on the printer selected and the capabilities of that printer. Graphics also preview on the PRINT VIEW screen. LARGE

Figure 2: View Document displays font changes.



Special Characters that **will** print on the *selected* printer show up (eg. K|-A), ones that **won't** show as blanks (eg

Figure 3: Special Characters also appear.

MacWorld: Multimedia Computing

Geoffrey Rockwell
rockwell@gpu.utcs.utoronto.ca

MacWorld, one of the major Macintosh magazines, hosts a conference dedicated to the Macintosh every August. The conference often is an occasion for announcements of new products by Apple. Such was not the case this year. Instead, Apple outlined the direction they are taking: multimedia computing.

Multimedia computing involves working with documents which combine different media, such as text, sound, and animation. Ultimately, Apple hopes users will be able to manipulate television-quality video on the computer in the same way they presently manipulate text, and to perform such operations with the ease typical of most Macintosh applications. Whereas Apple showed the promise of things to come, other companies demonstrated actual products that bring us closer to personal multimedia on the Macintosh.

One of the major problems hindering multimedia computing is getting the video image onto the computer screen. Apple hopes to develop an add-on board which will allow the computer to store and manipulate video digitally, as it does with other information. The board will also be able to retrieve the video information and display it at the correct speed. Because video information consumes so much storage space, it is not feasible now to store more than a few seconds, nor is it possible to play back those few seconds in real time. For this reason, existing multimedia works that include video keep the video on a peripheral storage device, like a VCR or video disc, and play it on a separate monitor. The computer runs the video disc player.

Computers can route the video through the monitor or capture single images digitally. A number of companies exhibited boards which “capture” the NTSC signal from a VCR and display it in a window on a Mac II screen. This allows you to preview video footage already created. Few of these boards let you do much more than grab a single image and save it for use in a graphics program. Mass Microsystems manufactures a board called ColorSpace II for the Mac II; this board projects video through the Mac II monitor.

At least two companies have developed software that provides the means for you to control a VCR or laser disc player from within HyperCard stacks and, if you have a board such as the one mentioned above, to display the video within HyperCard or on a separate monitor. You can create HyperCard stacks with sound and video portions with this software. In order to use these stacks, you need a video disc player and a capture board or a separate monitor. To produce such materials, you must both create the software and record the video in the traditional manner. Pressing a video disc is, unfortunately, expensive. It costs about $1500 (US) to create the master of an eight-inch CAV (constant angular velocity) disc, and $8 per copy.

Multimedia publishers are taking advantage of this new technology. **Newsweek** recently created a multimedia work concerning the events of Tienamen Square. Those with the necessary hardware and software can navigate the information on a Mac, read short essays on the events and, where appropriate, see photographs taken and hear interviews conducted by Newsweek reporters on location. Likewise, **ABC** created a work about Martin Luther King.

Voyager has works which look at Vincent van Gogh, the National Gallery of Art, and the Louvre. (See the March 1989 issue of *ComputerNews* for more information.) The Louvre piece is a collection of 35,000 still images and video commentary. The educational possibilities of such technology are many. Educators will be able to combine types of information from different media that traditionally have been separated or inaccessible.

More conventional information products were also displayed at MacWorld. **Silver Platter** highlighted their collection of traditional information products: compact discs (CDs) with *Med Line,* a biomedical information database, *ERIC,* a bibliographic database, *PETERSON'S GRADLINE,* a listing of over 3,100 accredited and degree-granting colleges in Canada and the United States, and *A-V ONLINE,* an inventory of audiovisual materials available from the National Information Center for Educational Media. All of their CDs are searched by the same Mac software. If you learn to use their software to search one CD database, you know how to search the others.

HyperCard Utilities

For HyperCard users, a number of useful utilities, plus two alternatives to HyperCard, were displayed at the show. *HyperTimon* is a script editor and debugger that allows you to see and edit more than one script at a time, and enables you to step through a script, executing one line at a time.

Dialoger is a stack of XCMDs, with which you can create various Dialog boxes within HyperCard. Dialog boxes are the fixed boxes with the heavy black border that appear most often when you have to make a choice before going on. In fact, they can be used for virtually anything. With Dialoger you can create modeless boxes that float above HyperCard like a tool palette.

Plus is an alternative to HyperCard that allows you to use colour in stacks and to create cards of any size. (HyperCard limits the card size to the size of a Mac Plus screen.) It will recompile HyperCard stacks to work as Plus stacks. The added stacks make Plus slower than HyperCard. As the product is new, its stability is questionable.

Hot Spot is a graphics and text linking tool with which you can link graphics and text files created in other programs. This is achieved by adding buttons, which are superimposed on the files. The result resembles HyperCard and the Finder combined. You can bounce from file to file by using the superimposed buttons. It is difficult to determine whether this is a robust application or simply another HyperCard clone with less power than Plus or *SuperCard*.

Of Interest to Academics

In addition to multimedia products, there were products of interest to academics. *Nisus* is a full-featured word-processing program, with macros, that possesses advanced searching capabilities (see *Figure 1*). With the combination of macros and advanced searching, you can create a word type index (an index of all the unique words) or produce a word frequency list. Nisus also has a graphics layer that allows you to draw over text. You can anchor the drawings to the paragraph on which they were created: if the paragraph moves, the graphics follow. UTCS has a demonstration disk of Nisus which you can copy for evaluation.

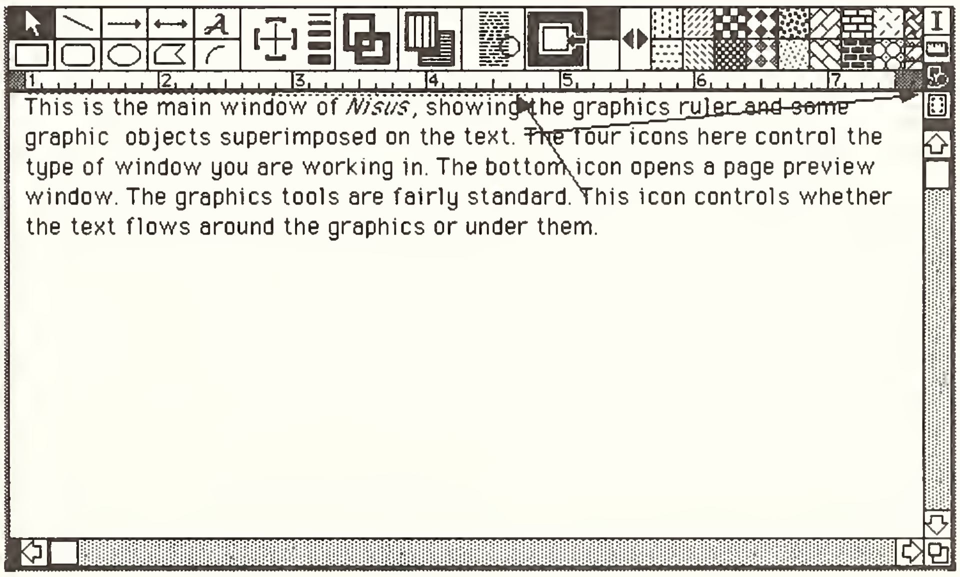

This is the main window of *Nisus*, showing the graphics ruler and some graphic objects superimposed on the text. The four icons here control the type of window you are working in. The bottom icon opens a page preview window. The graphics tools are fairly standard. This icon controls whether the text flows around the graphics or under them.

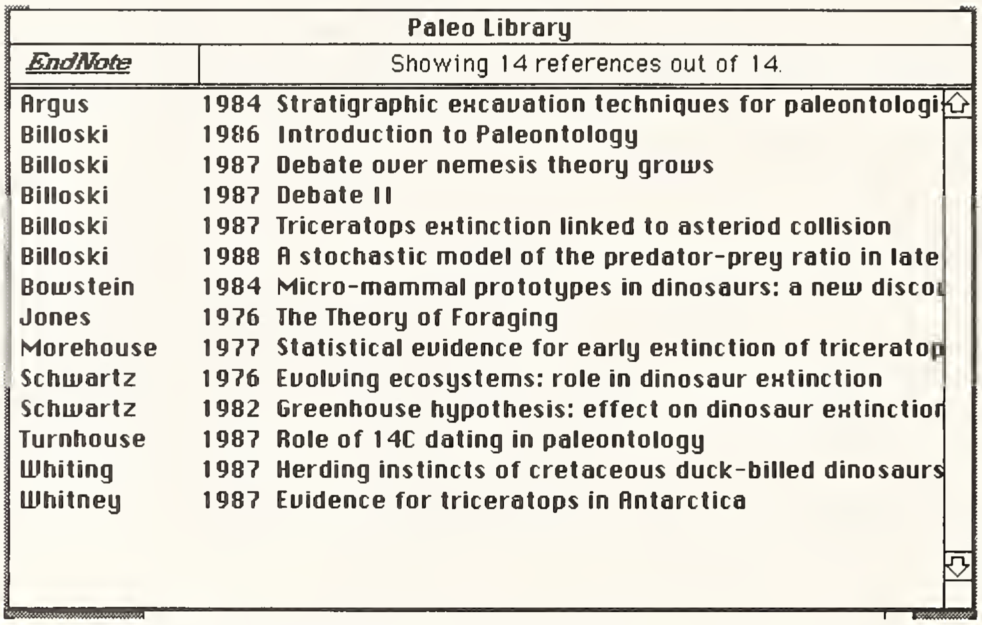
Figure 1: Nisus icons control windows and text flow.

Sonar is a program that indexes large collections of text and allows you to rapidly search the text for complex patterns. Unlike many indexing programs, it allows you to add comments to the text after it has been indexed. The comments appear when you view the text to which they refer. The program was created for the business community, particularly companies which handle a large volume of correspondence, and it is priced accordingly. A demonstration version is available for evaluation.

One of the best utilities available was **Dayna's** *DOS Mounter*. This program runs when you start the computer, and allows the SuperDrives in a Mac IIx or SE 30 to mount DOS disks. It maps extentions so that IBM PC files with a user-definable extention can be opened automatically by the application you select.

Bibliographic Tools

Pro-Cite and *End-Note* are two bibliographic database products that were demonstrated at MacWorld. The first is a powerful and expensive package which also exists for IBMs. It has two companion products, *Biblio-Link*, and the soon-to-be-released *Pro-Search*. Biblio-Link takes the text files resulting from online searches and prepares them for import to a Pro-Cite database. Thus, you can search online databases and save the results into your own database for future use. Pro-Search is a program designed for searching specific online databases, such as Dialog. It allows you to prepare your search in advance and to execute it quickly, thereby saving money. Demonstrations of the IBM and Mac versions of Pro-Cite are available at UTCS.



```
Argus       1984 Stratigraphic excavation techniques for paleontologi
Billoski    1986 Introduction to Paleontology
Billoski    1987 Debate over nemesis theory grows
Billoski    1987 Debate II
Billoski    1987 Triceratops extinction linked to asteriod collision
Billoski    1988 A stochastic model of the predator-prey ratio in late
Bowstein    1984 Micro-mammal prototypes in dinosaurs: a new disco
Jones       1976 The Theory of Foraging
Morehouse   1977 Statistical evidence for early extinction of triceratop
Schwartz    1976 Evolving ecosystems: role in dinosaur extinction
Schwartz    1982 Greenhouse hypothesis: effect on dinosaur extinctio
Turnhouse   1987 Role of 14C dating in paleontology
Whiting     1987 Herding instincts of cretaceous duck-billed dinosaurs
Whitney     1987 Evidence for triceratops in Antarctica
```

Figure 2: Endnote for personal reference-keeping.

End-Note is a relatively inexpensive bibliographic tool best suited to personal reference-keeping on the Mac (see *Figure 2*). Its database capacity is 32,000 entries, and it does not handle as many types of works as Pro-Cite. It does, however, work closely with Microsoft Word, Version 4.0. End-Note is both a desk-accessory and an application. Within Word, you can look up existing references and enter new ones. In order to cite a reference, you copy a special code from the End-Note DA. When your paper has been finished, the End-Note application will go through the Word document and produce a formatted bibliography from the special codes. The bibliography is appended to the paper so that the paper is complete the next time you open it. The codes are replaced with proper references.

End-Note also has a companion product, End-Link, for preparing the text files that result from online searches for your End-Note database.

For those interested in using the Mac to organize ideas, another idea processor, *Inspiration,* was demonstrated. It is like *Acta* and *More* in that it possesses outlining, but you can also work on the outline in a graphics mode where icons represent the headings and lines represent the relationships. (See the May/June issue of *ComputerNews* for a review of *Acta and More.*)

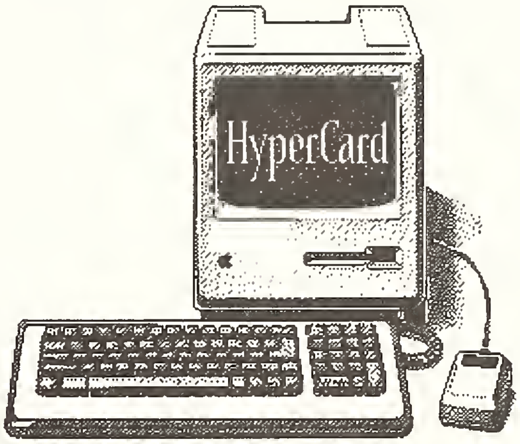
For UNIX users, an Australian company has produced a version of UNIX that will run on any Mac (Mac Plus and higher). Called *MacIDRIS,* it is designed for educational institutions which need to set up inexpensive UNIX classes. Apple UNIX, in comparison, will run only on Mac II class machines.

For teachers, **Mountain Lake** has developed an interesting product called *MAKETEST*, designed for preparing tests. You can choose from different types of questions (multiple choice, essay, and fill-in-the-blank) and maintain a small database of questions from which you draw the published tests. It even allows you to set the level of difficulty of the questions, and to command the program to create a test with a specific combination of questions of different levels. MAKETEST then searches the database and gathers questions randomly, according to your specifications.

Last, but not least, **Articulate Systems** demonstrated a voice recognition system. The box, which resembles a hard disk drive, plugs into the SCSI port. With this you can create sets of 1000 words that it will recognize. These sets have to be trained, but once trained, the built-in microphone can be used to issue commands to the Mac.

For more information about these products, or demonstrations (where available), please call Geoffrey Rockwell at 978-4548.

HyperCard Seminar



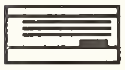
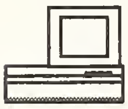
Many people have been asking about HyperCard – What is it? Should they be interested? For those who wish to learn this package, UTCS has developed an introductory seminar on HyperCard and its capabilities. The seminar will cover basics only, with Participants learning to create and modify simple stacks. It is suitable as preparation for the more advanced HyperCard course offered by Apple's ARPP program here at U of T.

For dates and times call Irene Rosiecki at 978-4565.

To register in the seminar, please call Irene Rosiecki at 978-4565. For more information about the seminar's content, please contact John Bradley at 978-3995.

Macintosh Models

Dariusz Dabek
dabek@vm.utcs.utoronto.ca

Model	Processor	Coprocessor	Ram	Internal Storage
Macintosh Plus 	MC68000; 7.83 MHz	none	1MB; expandable 4MB	One built-in 3.5" 800K floppy disk drive
Macintosh SE 	MC68000; 7.83 MHz	none	1MB; expandable 4MB	One built-in 3.5" 800K floppy disk drive Second 3.5" 800K floppy disk drive or 3.5" SCSI Hard Disk
Macintosh SE/30 	MC68030; 15.667 MHz	MC68882	1MB; expandable 8MB	One built-in 3.5" 1.4 MB floppy disk drive or 3.5" SCSI Hard Disk
Macintosh IIcx 	MC68030; 15.667 MHz	MC68882	1MB; expandable 8MB	One Built-in 3.5" 1.4 MB floppy disk drive or 3.5" SCSI Hard Disk
Macintosh II 	MC68020; 15.667 MHz	MC68881	1MB; expandable 8MB	One built-in 3.5" 800K floppy disk drive or floppy disk drive Second 800K or 1.4MB63.5"/ 5.25" SCSI Hard Disk
Macintosh IIx	MC78030; 15.667 MHz	MC68882	1MB; expandable 8MB	One built-in 3.5" 1.4 MB floppy disk drive or 3.5"/5.25" SCSI Hard Disk

Model	Screen	Interfaces	Networking
Macintosh Plus	9" diagonal 512 by 342 pixel bitmapped display	Two RS232/RS422 serial ports One SCSI port External disk drive port Sound port	Built-in Apple Talk capability
Macintosh SE	9" diagonal 512 by 342 pixel bitmapped display	Two RS232/RS422 serial ports One SCSI port Two Apple Desktop Bus ports Macintosh SE expansion slot External disk drive port Sound port	Built-in Apple Talk capability Optional Ethernet
Macintosh SE/30	9" diagonal 512 by 342 pixel bitmapped display	Two RS232/RS422 serial ports One SCSI port Two Apple Desktop Bus ports 030 Direct Slot (full 32 bits) External disk drive port Stereo Sound port	Built-in Apple Talk capability Optional Ethernet
Macintosh IIcx	Monitor sold separately	Two RS232/RS422 serial ports One SCSI port Two Apple Desktop Bus ports Three internal NuBus slots External disk drive port Stereo Sound port	Built-in Apple Talk capability Optional Ethernet, Token Ring
Macintosh II	Monitor sold separately	Two RS232/RS422 serial ports One SCSI port Two Apple Desktop Bus ports Six internal NuBus slots Stereo Sound port	Built-in Apple Talk capability Optional Ethernet, Token Ring
Macintosh IIx	Monitor sold separately	Two RS232/RS422 serial ports One SCSI port Two Apple Desktop Bus ports Six internal NuBus slots Stereo Sound port	Built-in Apple Talk capability Optional Ethernet, Token Ring

The Dash—More Than Just A Straight Line

Ihor Prociuk
ihor@vm.utcs.utoronto.ca

Before the invention of "desktop publishing", type setters (the people, not the machines) were the guardians of the printed word, with responsibilities that extended far beyond the margins of the page. They had to make the finished product consistent, readable, and attractive. A book may get its soul from the author, but its voice comes from the type setter. The setting of type is as much an art as it is a science.

Take something as simple as the length of the printed line. Make it too long and the eye will get lost on the return trip. Make it too short and the eye grows weary from too much marching (right, left, right, left, . . .). Pull in the margins and display the text in italics and you can make words talk. Use larger bold type to stop readers in their tracks, while you change chapters or topics, or give them some time to collect their thoughts with just a few blank lines. Should notes have "feet" for quick reference, or "ends" so they don't interfere with the train of thought? Bullet or number—which should be used to introduce an item in a list?

Setting type is more than just keying in the author's manuscript. Often the type setter has to make up for the typewriter's shortcomings.

Consider the dash. Just to refresh yourself, find a manual typewriter (you'll recognize it right away—it doesn't have a video screen). Go ahead, I'll wait. . . . Find one? Good. Take a look at the keys. Notice anything peculiar? That's right! There's only one kind of dash! How the business world managed to survive and thrive with just one kind of dash—for so long—will provide future graduate students with rewarding thesis topics. We may discover that Western society was pulled back from the brink of financial collapse not by bank barons and astute politicians but by secretaries who, spotting the trends and seeing that desktop publishing was imminent, took quick action.

Some took the simple approach using two dashes side-by-side (- -). Not elegant but direct. The more mechanically skilled actually rolled back the paper a half a line and used the underscore character (_). Others rewrote entire sentences to avoid the use of the long dash. Of course, when typewriters were replaced with word processors there was no way to roll back the paper; rewriting or two dashes had to suffice.

Today, the importance of the dash, and its correct use, is recognized in most word processing and desktop publishing packages. There are actually several kinds of dashes and each has its place on the printed page.

Hyphen

This is the "dash" on the keyboard (usually to the right of the zero in the top row of number keys). Use the hyphen in compound words, such as:

on-screen
line-by-line
word-processing

The hyphen is also used to split words across lines; hence, hyphenation. There are no spaces before or after the hyphen when it is used in the middle of a word.

En Dash

The en dash gets its name from the fact that it is as wide as the letter "n" in whatever typeface you are using. For example:

n
–

Use the en dash to indicate continuing or inclusive numbers, dates, time, or reference numbers:

1946–1989
pp. 64–88
10:00–11:30 P.M.

The en dash is also used in compound adjectives where one element is two words or an hyphenated word:

New York–Toronto flight
quasi-public–quasi-judicial body

As with the hyphen, there are no spaces before or after the en dash, the one exception being when the en-dash is used as the minus sign.

1 – 1 = 0

To input the en dash on the Macintosh (in *any* word-processing program using "regular" text fonts), hold down the Option key while you press the hyphen key. In WordPerfect or Microsoft Word on the PC, find a short dash within the alternate characters and use it as an en dash.

Em Dash — — — — — — —

If a sudden break in thought causes an abrupt change in the sentence structure, use the em dash. (I leave it as an exercise to the reader to deduce where the em dash gets its name.)

> Because the wrong dash was used—the reasons will be discussed later—the company lost the account.
>
> Fitz, Wadley, and Pinkerton—these are programmers to be admired.

To key in the em dash on the Macintosh, hold down both the Option key and the Shift key while you press the hyphen key. In WordPerfect and Microsoft Word on the PC, there is no special method for entering the em dash. You may have to resort to using two hyphens.

2-em Dash —— —— —— —— ——

When you want to indicate missing letters in a word, use the 2-em dash:

> What the h—— is going on?
> I don't give a d——m what you say.

If you are indicating missing letters in the middle of a word, do not put spaces before or after the 2-em dash. If you are indicating missing letters at the end or beginning of a word, then normal word spacing prevails.

There is no direct way to enter a single 2-em dash from the keyboard, but you can substitute two em dashes, side-by-side, in Macintosh software, or try using the line draw functions in PC software.

3-em Dash ——— ——— ——— ——— ———

When an entire word is missing, use the 3-em dash. Again, the 3-em dash cannot be entered directly from the keyboard, but you can use three em dashes in a row. In WordPerfect or Microsoft Word on the PC, you could resort to using line draw.

> *"If you had used the proper dash, we wouldn't have lost the ——— contract!"*, he yelled.

In bibliographies, to indicate that the current reference has the same author as the previous reference, use the 3-em dash:

> Simmons, David. *The em dash—symptom or cause in the rise and fall of the Roman Empire.* Journal of the History of Writing, 41 (1986): 612–628
>
> ———. *Beyond the 3-em Dash.* Journal of Advanced Typesetting, 12 (1988): 28–30.

Conclusion

Now no one is going to force you to use the correct dash. It's not like someone from the Standing Committee For The Proper Use Of The Em Dash will descend upon your office and confiscate all copies of your software. However, if you want to feel part of a hard-working group of unsung heros who single-handedly saved the world from financial ruin...

Sources of Information

The Chicago Manual of Style, Thirteenth Edition. Chicago: University of Chicago Press, 1982.

The Chicago Guide to Preparing Electronic Manuscripts for Authors and Publishers. Chicago: The University of Chicago Press, 1987.

Microcomputer Short Courses

Irene Rosiecki
rosiecki@vm.utcs.utoronto.ca

UTCS offers various noncredit microcomputer courses to faculty, staff, and graduate students of the University of Toronto. These courses cover a number of applications available for the PC or the Macintosh. Whether you will be typing a thesis on a word processor, or working with spreadsheets, databases, or desktop publishing, we may be able to help you get started.

Our class sizes are small, to allow for much individual attention. Continuing support is available upon completion of the course.

The following is a list of the microcomputer courses taught at UTCS:

Introduction to dBASE IV
Introduction to Desktop Publishing
Introduction to Disk Operating System (DOS)
Electronic Mail Seminar
Excel on the Macintosh
Introduction to HyperCard
Introduction to Lotus 1-2-3
Introduction to PageMaker
ProComm Communications Seminar
Introduction to SAS on the PC
Intermediate Applications of SAS on the PC
Microsoft Word on the Macintosh
Microsoft Word on the PC
Introduction to WordPerfect 5.0
Advanced WordPerfect 5.0 Topics
Introduction to WordPerfect 5.0 for 4.2 Users

To find out about course dates and registration procedures, or to book a place in any of these courses, please contact Irene Rosiecki at 978-4565. Courses are filled on a first-come, first-served basis. The more popular courses fill up quickly, but waiting lists are maintained in case of cancellations.

Documents at UTCS

All vendor-produced documentation may be ordered through the UTCS Information Office, Room 201, 4 Bancroft Avenue. UTCS documents and selected vendor documents are also stocked there for purchase. For more information on prices, call Dale Wright at 978-4990. Whenever feasible, documents are made available online, and users are encouraged to print their own copies. On the VM machine, a special command has been provided for this purpose.

To print online documents on:

IBM VM/CMS	***GP UNIX***
Type "help document"	Use *lpr* command

The following examples relate to the table below. The document to be printed is the UTCS Guide to Census Tapes, called CENSUS LISTING on CMS and /usr/doc/utcs/census on GP UNIX. <RETURN> means RETURN or ENTER key.

CMS:

```
document <RETURN> <RETURN>
laser census listing (forms yxle <RETURN>
```

GP UNIX:

```
nohup lpr -8p -fyxle /usr/doc/utcs/census & <RETURN>
```

UTCS Documents in hardcopy

New:

Previously announced:

- Academic's Guide to Microcomputer Systems
- Character Sets for Highspeed Printing
- UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction
- UTCS GUIDE TO PRODUCTS AND SERVICES: Basics
- UTCS GUIDE TO PRODUCTS AND SERVICES: Accounting
- UTCS Catalogue: Numerical Products
- UTCS Catalogue: Statistics Products
- UTCS Catalogue: Text Products
- UTCS Guide to Census Tapes
- UTCS Guide to Kermit
- UTCS Guide to Micro File Transfer Service
- UTCS Guide to Text Processing on GP UNIX

UTCS Documents online

	CMS LISTING	GP UNIX	Forms Code
New:			
Previously announced:			
UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction	INTRO	/usr/doc/utcs/intro	*
UTCS GUIDE TO PRODUCTS AND SERVICES: Basics	BASICS	/usr/doc/utcs/basics	*
UTCS Catalogue: Access, Part 1	ACCESS1	/usr/doc/utcs/access1	*
UTCS Catalogue: Access, Part 2		/usr/doc/utcs/access2	*
UTCS Catalogue: Numerical Products	NUMCAT		*
Product-Function List	NUMLIST		BXQD
UTCS Catalogue: Statistics Products	STATCAT		*
Product-Function List	STATLIST		BXQD
UTCS Catalogue: Text Products	TEXTCAT	/usr/doc/utcs/textcat	*
UTCS Guide to BMDP	BMDP		*
UTCS Guide to Census Tapes	CENSUS	/usr/doc/utcs/census	*
Recipes for Using Tapes on VM/CMS	QUIKTAPE		*
UTCS Guide to FORTRAN on VM/CMS	FORTRAN		*
UTCS Guide to GP UNIX		/usr/doc/utcs/gpunix	*
UTCS Guide to Highspeed Printing	PRINT	/usr/doc/utcs/print	*

* *Recommended forms code for the 8700 is YXLE unless otherwise stated.*
† *Use the 87set command. Type "help 87set".*

Documents continued

UTCS Documents online continued

	CMS LISTING	GP UNIX	Forms Code
UTCS Guide to Kermit	KERMIT	/usr/doc/utcs/kermit	*
UTCS Guide to Micro Laser Printing Service	MICRLASR		*
UTCS Guide to SAS	SAS		*
UTCS Guide to SCRIBE	SCRIBE		*
(For printing instructions, see page 1 of document)			
UTCS Guide to Series/1 Terminal Use	SERIES		*
3270 Emulation:			
Cybernex APL100 and Volker Craig VC404	CYBER		*
DM1520	DM1520		*
Hardcopy Terminal	HARDCOPY		*
IBM 3101	IBM3101		*
IBM PC Kermit	PCKERMIT		*
SOROC IQ	SOROC		*
VT52	VT52		*
VT100	VT100		*
UTCS Guide to SPSS	SPSS		*
UTCS Guide to Text Processing on GP UNIX		/usr/doc/utcs/text	YXOG
UTCS Guide to TFW.MAK in SCRIBE	TFWMAK		*
UTCS Guide to VM/CMS	CMSGD		*
UTCS Guide to WSCRIPT	WSCRIPT		*
UTCS Rate Schedule (Commercial)	RATESCOM		†
UTCS Rate Schedule (External)	RATESEXT		†
UTCS Rate Schedule (Internal)	RATESINT		†

Other Documentation online

Electronic Mail			
A User's Guide to Electronic MAIL	MAILBOOK		YXOC
Kermit			
Kermit Protocol Manual	KERMITPM		YXOE
Kermit User Guide	KERMITUG		YXOF
ProComm			
ProComm Reference Manual	PROCOMM		YXOE
VMBATCH Documents			
VMBATCH User's Guide	VMBATCH		YXOA
VMBATCH Messages and Codes	VMBATMC		YXOA
VMSECURE			
VMSECURE User's Guide	VMSECURE		YXOE
VM Tape Documents			
TapeMap User's Guide and Reference	TAPEMAP		*
VMTAPE Messages and Codes	VMTMSGS		YXOE
VMTAPE User's Guide	VMTUSER		YXOE
Waterloo SCRIPT			
Reference Manual	WSCRPTRF		YXLC
User's Guide	WSCRPTUG		YXLC
Using SCRIPT in MVS/TSO	WSCRPTSO		YXLC
Waterloo SCRIPT and a PostScript Printer	WSCRPTPS		YXLC
Formula Processor Summary	WSCRPTFP		YXLC
GML User's Guide	GMLUG		YXLC
GML Reference Summary	GMLRFSUM		YXLC

** Recommended forms code for the 8700 is YXLE unless otherwise stated.*
† Use the 87set command. Type "help 87set".

Consulting and Enquiries

Applications Support & Advising Supervisor	Alex Nishri	BC214	978-7109
External Marketing Consultant	Ihor Prociuk	BC217	978-6875
Erindale College	Joe Lim	ER2035	828-5311
Information Office	Dale Wright	BC201	978-4990
Account & Access Code Enquiries	Sylvia May	BC101B	978-7148
IBM PC Maintenance	Kam Mark	BC103	978-5050
Tape Library (Academic Services)	Susan Kovago	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
Terminal Service	Rosi Tseu	BC105	978-7087
UTCS Noncredit Short Courses	Irene Rosiecki	BC217	978-4565

Consulting & Advising Services:	978-HELP
CMS, and GP UNIX userids:	ADVISOR
CMS Userid for mail problems:	POSTMSTR
System Status Enquiries (GP UNIX)	978-4318
System Status Enquiries (IBM)	978-7393
Interactive Services 300 (bps)	978-3959
Interactive Services 1200 (bps)	978-3959
Interactive Services 2400 (bps)	978-7239

UTCS Directory

Director:	Dr. Warren Jackson	BC118	978-8948	wcj@vm.utcs.utoronto.ca
Associate Director:	Eugene Siciunas	BC116	978-5058	eugene@vm.utcs.utoronto.ca
Managers:				
Communications &Technical Support	Norman Housley	BC121B	978-4967	norman@vm.utcs.utoronto.ca
Information Centre	Don Gibson	BC217	978-7331	don@vm.utcs.utoronto.ca
Internal Systems Support	Ron Vander Kraats	BC121A	978-4428	rvk@vm.utcs.utoronto.ca
Operations Support	Dr. Bob Chambers	MP350	978-7092	
Systems Support	Bill Lauriston	MP331	978-3579	bill@vm.utcs.utoronto.ca

Committees on Computing

Supercomputer Users' Group at U of T	Chair	Prof. W.R. Peltier	978-2938
Research Board Standing Committee on Computing	Chair	Prof. C.C. Gotlieb	978-2986

Legend

BC = Bancroft Building
ER = Erindale
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

UTCS Terminal and Advising Sites

Names and Locations

Central Advising Office (CAO), 978-HELP
Engineering Annex (EA, CDF), 11 King's College Road, Rooms 103, 107, 107B, 201, 203
Erindale College (Erin), 828-5339, Mississauga Road, Erindale Campus, Rooms 2037, 2039A-B-C, 2045
Robarts, Robarts Library, 130 St. George St., Room 1061A
Sidney Smith (Sidney), 100 St. George St., Rooms 1071, 2105
St.Michael's College, 121 St. Joseph St., Room 107
Trinity College, 6 Hoskins Ave., Room 024
Victoria University, 73 Queens Park Cres., Room 208

Access Hours

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	**Fri**	**Sat**	**Sun**		
CAO	10:00-18:00	10:00-18:00	closed	closed	Research	978-HELP
CDF	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	No
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Erin (2039)Δ	9:00-17:00	9:00-17:00	12:00-16:00	12:00-16:00	Research	Rm 2005
(2045-46-47)	24 hrs	24 hrs	24 hrs	24 hrs	Undergrads	Rm 2005
(235)†	8:00-22:00	8:00-17:00	closed	closed	None	Rm 2046
Robarts	8:30-24:00	8:30-24:00	9:00-22:00	13:00-22:00	None	978-HELP for Research
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
St.Michael's	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Trinity	8:00-22:00	8:00-22:00	8:00-22:00	8:00-22:00	None	978-HELP for Research
Victoria	8:30-21:00	8:30-21:00	8:00-13:00	8:00-13:00	None	978-HELP for Research

Sites	Advising Hours
CAO	Monday through Friday, 10:00 - 18:00
Erin	Monday through Friday, 09:00 - 22:00

Legend

* Research includes graduates, faculty, staff.
Δ Key access available.
† Access restricted to building hours.

Computer and Printer Access

Sites	PACX	Printers	CDF/PC Microcomputers
CDF	N	Y	N
EA	Y	Y	N
Erin	Y	Y	N
Robarts	Y	Y	Y †
Sidney	Y	Y	Y††
St.Michael's	Y	Y	Y††
Trinity	Y	Y*	Y††
Victoria	Y	Y*	Y††

(Y=yes, N=no)

* CDF/PC only † NEC †† TI/PC

UTCS Services

UTCS Centrally Owned and Managed

Systems

IBM VM/CMS
Technical Assistance: 978-6602

- General Purpose Timesharing environment
- Hub of the NetNorth network with access to BITNET, EARN and the Internet
- 4381-R02 processor with 32 megabytes of memory
- CP operating system, VM/SP HPO R4.2
- CMS timesharing system, VM/SP Release 4
- FTP and TELNET access to the campus ethernet, as well as Internet
- RSCS spooling system, Release 2.3

GP UNIX
Technical Assistance: 978-8853

- General Purpose Timesharing under SUN UNIX 3.2
- SUN 3/280, 8 megabytes of memory
- access to Linotronic typesetter
- offers a sophisticated and powerful environment for text processing
- offers a sophisticated programming environment suitable for commercial software development or testing
- full access to USENET, an electronic technical information exchange facility
- offers excellent electronic mail facilities and ability to send or receive mail from most computer networks worldwide, such as UUCPNET, ARPANET, NetNorth, BITNET, CSNET, CDNNET

Services

Communications & Technical Support
Primary Phones: 978-3787, 978-4967

- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- Field Service Group installs and maintains communications and computer systems, particularly IBM PCs, Micro Vaxes, and Macintoshes, on a contract basis or on a cost-per-call basis.
- provides consulting on computer systems technology and installs computer systems
- provides access between the IBM systems and machines using UNIX, VMS and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides consulting on local area networking and installs LANS
- provides access to NetNorth (BITNET), the North American Universities Network; ONET, the Ontario Regional Network; and USENET, the UNIX networking fraternity
- provides gateway to the US Internet
- will provide a communications solution to department needs on a contractual basis

Information Centre
Primary Phone: 978-HELP

- Provides assistance in use of electronic messaging, including use of Local Area Networks (LANS); NetNorth/BITNET/EARN, the world Universities network; CDNNET, the Canadian X.400 network; ARPANET; CSNET; USENET; and other international connections.
- provides advising, consulting and documentation on:
  - command languages, including CMS and UNIX
  - high level languages, including FORTRAN, and PL/I
  - packages and libraries, including SAS, SPSS, BMDP, IMSL, and NAg
  - editors and formatters, including XEDIT, ed, nroff/troff
- provides general micro support
  - selection consulting for hardware and software
  - Micro Lab for evaluation of hardware and software
  - advice on University discounts
  - media conversion and data transfer
  - CD-ROM access to software and information discs
  - offers Micro Laser Printing Service
  - offers 35mm slide production service using Polaroid Palette
  - administers Local Area Network of PCs for Education Facility
  - administers Macintosh Education Facility
- high quality typesetting
- installs and maintains application packages
- administers site licenses for various software packages
- provides short courses and seminars on the more popular services and software packages

> *The mandate of UTCS is to encourage and support the use of information technologies across campus, and to plan, implement, and operate common-carrier networks and certain appropriate central computer facilities.*

Facilities Managed by UTCS

Administrative Computing

- administrative IMS, DB2, Batch, and TS0
- 3081K processor, 48 megabytes of memory
- MVS/XA operating system

Computer Disciplines Facility/UNIX

SUN 3/280s, 16 megabytes of memory (zero.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

SUN 3/280s, 16 megabytes of memory (one.cdf)
- Computer Science interactive access
- SUN UNIX 4.0.3

Computer Disciplines Facility/PC

- 40 NEC computers connected in a Local Area Network
- 66 TI Professional Computers connected in a Local Area Network
- introductory Computer Science instruction
- MS-DOS with Turing environment

Erindale College Systems

VAX 8200, 8 megabytes of memory
- instructional access using VMS
- research access

VAX-11/750, 5 megabytes of memory
- instructional access using UNIX (Berkeley UNIX 4.3BSD)

Institutional Relations System

VAX-11/750, 8 megabytes of memory
- database services to the owner departments using VMS

EPAS Facility

- 4361-5 processor, 16 megabytes of memory
- general VM/CMS services to the owner departments

Ontario Centre for Large Scale Computation (OCLSC)

- Cray Research Inc. X-MP/24
- 2 processors, 4 megawords main memory
- solid state disk (SSD) with 64 megawords of storage
- COS 1.17 operating system
- VAX 8350 + MicroVAX II and VAX750 provide VMS front-end services

Software List

SOFTWARE LIST for MICROCOMPUTERS

The following are microcomputer software packages for which UTCS can provide either support or some information. As with mainframe products, micro packages receive full support (Class A), limited support (Class B), or no active support (Class C). The specific criteria differ from those for mainframe classes and are outlined in the Academic's Guide to Microcomputer Systems.

Package/Compiler	Version	Environment	Support
Application Development Tools			
Assembler			
Microsoft Assembler	5.1	MS-DOS 3.3 & OS/2	B
MPW Assembler	2.0.2	Macintosh	B
BASIC			
GW BASIC	—	MS-DOS	B
C			
Microsoft C	5.1	MS-DOS	B
MPW C	2.0.2	Macintosh	B
WATCOM C & Express C	6.0	MS-DOS	B
FORTRAN			
IBM FORTRAN/2	1.0	MS-DOS 3.3 & OS/2	B
Language Systems FORTRAN	1.0	Macintosh	C
Microsoft FORTRAN	4.0	MS-DOS	B
WATCOM WATFOR-77	3.0	MS-DOS	A
Pascal			
MPW Pascal	2.0.2	Macintosh	C
TURBO Pascal	—	MS-DOS	B
Tools			
ResEdit	1.2d0	Macintosh	B
HyperCard	1.2.1	Macintosh	A
Macintosh Programmer's Workshop	2.0.2	Macintosh	B
WATCOM GKS	1.3	MS-DOS	B
Communications			
File Transfer & Terminal Emulators			
Kermit	0.8(35)	Macintosh	A
Kermit	2.30	MS-DOS	A
Kermit	—	Apple II DOS	C
Kermit	—	CP/M	C
DeskLink	2.21c	MS-DOS	B
Lap-Link Mac	2.0	Macintosh	B
Lap-Link PC	2.16	MS-DOS	B
MacTerminal	2.2	Macintosh	B
PC TALK3	—	MS-DOS	C
PC PLOT III	—	MS-DOS	C
ProComm	TU 2.4.2	MS-DOS	A
Red Ryder	10.3	Macintosh	B
Remote^2	1.01	MS-DOS	B
Network Systems			
AppleShare	2.0.1	Macintosh	B
Novell Advanced Netware	2.0a	MS-DOS	B
STARLAN	3.1	MS-DOS	B
TOPS	2.1	Macintosh	B
TOPS	2.1	MS-DOS	B
Network System Utilities			
Inter•Poll	1.0	Macintosh	B
Database Managers			
4th Dimension	Int. 1.03	Macintosh	B
Archivist	1.02b	MS-DOS	B
AskSam	3.03	MS-DOS	B
Clipper	S87	MS-DOS	B
DATAEASE	2.5R3	MS-DOS	B
dBASE IV	1.0	MS-DOS	A

Software List continued

Package/Compiler	Version	Environment	Support
FoxBASE Mac	2.0	Macintosh	B
Notebook II	2.03	MS-DOS	C
Desktop Publishing			
Fontographer	n/a	Macintosh	C
PageMaker	3.01	Macintosh	A
PageMaker	3.0	MS-DOS	A
Ready Set Go	4.0	Macintosh	C
Ventura	2.0	MS-DOS	B
XPress	1.0	Macintosh	C
Electronic Mail			
Microsoft Mail	1.36	Macintosh	B
QuickMail	1.0	Macintosh	B
Graphics			
Charting			
35mm Express	4.02	MS-DOS	B
Cricket Graph	1.2	Macintosh	C
Freelance Plus	3.0	MS-DOS	B
Harvard Graphics	2.1	MS-DOS	B
Lotus 1-2-3	2.01a	MS-DOS	B
Microsoft Excel	1.5	Macintosh	B
Microsoft Excel	2.0	MS-DOS	B
SigmaPlot	—	MS-DOS	C
Draw and CAD			
Aldus Freehand	1.0	Macintosh	B
Cricket Draw	1.1	Macintosh	C
Generic CADD	3.0	MS-DOS	C
MiniCad	4.05	Macintosh	C
Illustrator	1.0	Macintosh	B
Illustrator88	1.6	Macintosh	B
MacDraft	1.2b	Macintosh	C
MacDraw	1.95	Macintosh	A
MacDraw II	1.0v1	Macintosh	B
Windows Draw	1.02	MS-DOS	C
Image and Scanning			
Corel Draw	1.00	MS-DOS	B
ImageStudio	1.05	Macintosh	B
Publish Pac	2.0	Macintosh	B
Publish Pac	2.1	MS-DOS	B
Text Pac	2.0	MS-DOS	B
Paint			
DR HALO	1.23	MS-DOS	C
MacPaint	2.0	Macintosh	A
Microsoft Paintbrush	2.0	MS-DOS	C
PC Paintbrush	2.5	MS-DOS	C
SuperPaint	1.1	Macintosh	B
Windows Paint	2.03	MS-DOS	C
Plotting Subroutines			
WATCOM GKS	1.3	MS-DOS	B
Numerical			
Derive	1.14	MS-DOS	C
Eispack	n/a	MS-DOS	C
Eureka	n/a	MS-DOS	C
GAUSS	2.0	MS-DOS	B

Software List continued

Package/Compiler	Version	Environment	Support
Linpack	n/a	MS-DOS	C
MathCAD	2.0	MS-DOS	C
muMATH-83	4.12	MS-DOS	C
NAg Workstation Library	Rel. 1	MS-DOS	A
Solver-Q	---	MS-DOS	C
Operating Systems			
IBM PC, PS/2, and compatibles			
AIX PS/2 (Unix)	1.1	n/a	C
IBM OS/2 Extended	1.1	n/a	B
IBM PC-DOS	4.0	n/a	B
Microsoft MS-DOS (incl IBM PC-DOS)	3.3	n/a	A
Microsoft Windows 286	2.1	MS-DOS	A
Microsoft Windows 386	2.1	MS-DOS	A
Macintosh II, Macintosh SE, and Macintosh Plus			
A/UX (Unix)		n/a	C
Finder	6.1	n/a	A
MultiFinder	6.0.1	n/a	A
System	6.0.2	n/a	A
NeXT			
NeXT	0.9	n/a	B
Apple II			
Apple II DOS	3.3	n/a	C
CP/M	2.20	n/a	C
ProDos	1.0	n/a	C
Sound			
SoundWave	1.0	Macintosh	B
MacRecorder	1.0	Macintosh	B
Spreadsheet			
HAL	1.0	MS-DOS	B
Lotus 1-2-3	2.01a	MS-DOS	B
Microsoft Excel	1.5	Macintosh	B
Microsoft Excel	2.0	MS-DOS	B
Statistical			
BASS	88.10	MS-DOS	C
MACSPIN	1.5	Macintosh	C
Minitab	82.1.1	MS-DOS	C
PowerStat	1.04	MS-DOS	C
SAS/PC	6.03	MS-DOS	A
SPSS/PC+	3.0	MS-DOS	A
STATPRO	2.0c	MS-DOS	C
STATWORKS	1.2	Macintosh	B
SYSTAT	3.2	Macintosh	B
SYSTAT	3.2	MS-DOS	B
Word Processing			
Guide	2.0	MS-DOS	C
FinalWord II	2.0	MS-DOS	C
MacWrite	5.01	Macintosh	B
Manuscript	2.0	MS-DOS	C
Microsoft Word	3.01	Macintosh	A
Microsoft Word	4.0	MS-DOS	A
Nota Bene	3.0	MS-DOS	B

Software List continued

Package/Compiler	Version	Environment	Support
Nota Bene SLS	3.0	MS-DOS	B
PC-TeX	2.1	MS-DOS	B
Sprint	1.0	MS-DOS	B
T^3	—	MS-DOS	C
WordPerfect	4.2 & 5.0	MS-DOS	A
WordPerfect	1.0	Macintosh	C
WordPerfect Library	2.0	MS-DOS	C
WordStar	3.3	MS-DOS	C
Utilities			
Apple Turnover	—	MS-DOS	A
Fastback MAC	2.0	Macintosh	B
Fastback Plus	2.0	MS-DOS	B
Norton Utilities	4.5	MS-DOS	A
Copy II MAC	7.2	Macintosh	B
Mace Utilities	4.10	MS-DOS	B
MacZap	5.1	Macintosh	B
Sidekick	—	MS-DOS	C
TURBO Lightning	—	MS-DOS	C
XenoCopy PC	1.117	MS-DOS	A

Software List continued

SOFTWARE LIST for MAINFRAME COMPUTERS VM/CMS, UNIX

Each programming language or package available at UTCS has a support level. In general, Class A Products receive full support, Class B limited support (as time and resources allow), Class C no active support.

For complete details of UTCS product support policy, see the UTCS GUIDE TO PRODUCTS AND SERVICES: Introduction.

Package/Compiler	System	Support	Version
Communications			
FTP	VM/CMS	C	1.2.1
Kermit	VM/CMS	A	---
Kermit	UNIX	B	4C(058)
FTS	VM/CMS	A	---
MAIL/MAILBOOK	VM/CMS	A	86.359
MICROLASER	VM/CMS	A	---
macget/macput	UNIX	C	---
netcopy, netexec, to (NetNorth Tools)	UNIX	B	---
xmodem	UNIX	C	---
ftp,rsh,rlogin,telnet,rcp (Access via TCP/IP to most of the networked machines on all three campuses)	UNIX	B	---
rn/Pnews	UNIX	B	---
mail,mh,Mail	UNIX	-	---
TELNET	VM?CMS	C	1.2.1
Graphics			
PLOTBASIC (FORTRAN)	VM/CMS	C	---
SAS/GRAPH	VM/CMS	A	5.18
Languages			
ASSEMBLER(F)	VM/CMS	C	---
Concurrent Euclid	VM/CMS	C	1.9
FORTUTILS	VM/CMS	A	2.2
PL/I OPT Compiler	VM/CMS	B	1.5.1
REXX	VM/CMS	A	---
SNOBOL 4	VM/CMS	C	3.5
Turing	VM/CMS	C	---
VS FORTRAN	VM/CMS	A	1.4.1
VS Pascal	VM/CMS	C	2.2
Waterloo C	VM/CMS	C	1.3
WATFIV	VM/CMS	C	V2L0
WATFOR-77	VM/CMS	A	1.3
cc	UNIX	A	---
f77	UNIX	C	---
ratfor	UNIX	C	BSD std.
ttc	UNIX	C	---
pc	UNIX	C	BSD std.
yacc	UNIX	C	---
awk	UNIX	C	---
adb,dbx	UNIX	C	BSD std.
Numerical			
IMSL	VM/CMS	A	9.2,10.0
LINPACK	VM/CMS	C	---
MINOS	VM/CMS	C	5.1
MINPACK	VM/CMS	C	---
NAg	VM/CMS	A	Mark 11, 13
Statistical			
BMDP	VM/CMS	A	Level 85, Level 87
Minitab	VM/CMS	B	5.1
NAg	VM/CMS	A	Mark 11, 13
NTSYS	VM/CMS	C	1987
SAS	VM/CMS	A	5.18
SPSS^x	VM/CMS	A	3.1

Software List continued

Package/Compiler	System	Support	Version
Text Processing			
SCRIBE	VM/CMS	C	4(1400)-1
Waterloo SCRIPT	VM/CMS	B	86.1
XEDIT	VM/CMS	A	---
8700 Pseudotypesetting	VM/CMS	C	n/a
MICROLASER	VM/CMS	A	---
ed	UNIX	A	---
vi	UNIX	C	---
cmacs	UNIX	C	---
spell	UNIX	C	---
diction/explain	UNIX	C	---
eqn	UNIX	B	---
tbl	UNIX	B	---
pic	UNIX	C	---
troff	UNIX	B	---
nroff	UNIX	B	---
TeX	UNIX	C	---
Utilities			
FORTUTILS	VM/CMS	A	2.2
TPRINT	VM/CMS	C	---
TCOPYNL	VM/CMS	B	---
TCOPYSL	VM/CMS	B	---
crypt	UNIX	A	BSD std.
compress	UNIX	C	BSD std.
csh	UNIX	B	BSD std.
diff	UNIX	A	BSD std.
grep	UNIX	A	BSD std.
ipr	UNIX	B	---
learn	UNIX	C	BSD std.
patch	UNIX	C	---
sed	UNIX	A	BSD std.
sort	UNIX	A	BSD std.
sh	UNIX	A	BSD std.
tar	UNIX	A	BSD std.
uniq	UNIX	A	BSD std.

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